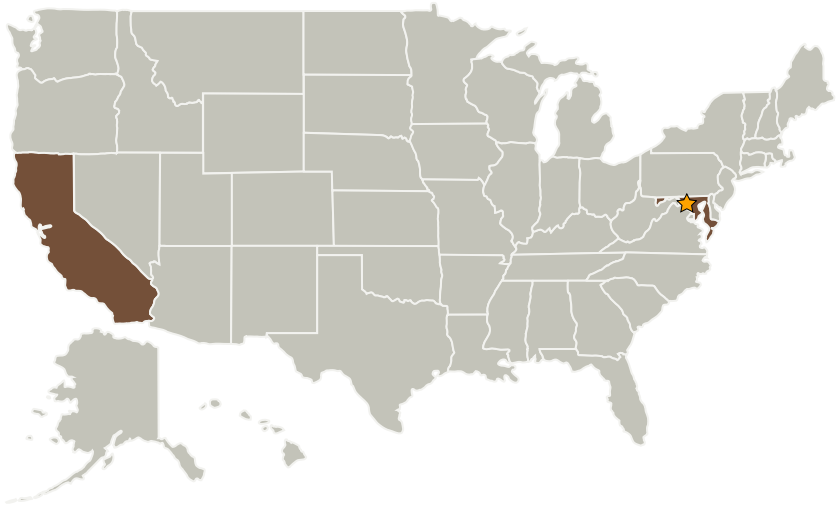
GPS Attitude Determination for Launch Vehicles, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

Toyon Research Corporation proposes to develop a family of compact, low-cost GPS-based attitude (GPS/A) sensors for launch vehicles. In order to obtain 3-D attitude measurements (roll, pitch, and yaw) conventional GPS/A systems require three or more antennas with relatively large baselines (~0.5 m). In sharp contrast, Toyon's GPS/A system can obtain 3-D attitude measurements with one or more single-aperture antennas. Toyon's GPS/A sensor is dubbed the Miniature Integrated Direction-finding Attitude-determining Anti-jam System (MIDAAS(TM)) and employs an innovative single-aperture antenna to compute full 3-D attitude using only two RF channels, leading to a smaller, simpler, lower-cost receiver system. A single (gyro-less) MIDAAS unit can be used to provide attitude information on very small launch platforms. In addition, multiple (gyro-less) MIDAAS units can be employed over larger baselines for increased attitude accuracy. A single (< 6.5-cm diameter) MIDAAS system also provides tactical-grade attitude performance when coupled with commercial-grade gyros at a significantly lower cost. Furthermore, MIDAAS provides active anti-jam protection and multipath mitigation thereby improving the integrity and robustness of the navigation system.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Toyon Research Corporation	Supporting Organization	Industry	Goleta, California

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Kenan Ezal

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.4 Attitude Estimation Technologies
    - TX17.4.3 Attitude Estimation Sensors